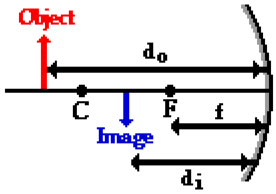
The Mirror Equation Part one



Ray diagrams can be used to determine the image location, size, orientation and type of image formed of objects when placed at a given location in front of a concave mirror. Ray diagrams provide useful information about object-image relationships, yet fail to provide the information in a **quantitative form (Number Problems)**. While a ray diagram may help one determine the approximate location and size of the image**,(Written Problems)** it will not provide **numerical information** about image distance and object size. To obtain this type of numerical information, it is necessary to use the **Mirror Equation** and the **Magnification Equation**.

The mirror equation expresses the quantitative relationship

between the object distance (d_o), the image distance (d_i), and the focal length (f). The equation is stated as follows:

$$\frac{1}{f} = \frac{1}{d_o} + \frac{1}{d_i}$$

The magnification equation relates the ratio of the image distance and object distance to the ratio of the image height (h_i) and object height (h_o). The magnification equation is stated as follows:

$$M = \frac{h_i}{h_o} = -\frac{d_i}{d_o}$$

Both of these are related to the work of a physicist known as Descartes – They are known as Descartes formula

Summary

$$M = \frac{h_i}{h_o} = -\frac{d_i}{d_o}$$

$$\frac{1}{f} = \frac{1}{d_o} + \frac{1}{d_i}$$